**Ionic Bonds – (metal with nonmetal)**

Part 1 – Writing formulas from names

1. Things to know
   1. Chemicals have two part names. The first part is positive the second is negative.
   2. Subscripts and Superscripts – Subscripts tell you how many of something you have, Superscripts tell you what the charge of something is.
      1. Example NH4+1
         1. Has 1 Nitrogen and 4 Hydrogens
         2. Has a charge of +1
   3. How to Criss-Cross – the charge of one tells you how many of the other one you will have
      1. Examples
         1. Cross Aluminum (Al+3) with Oxygen (O­­-2) =Al2O3
         2. Cross Beryllium (Be+2) with Oxygen (O­­-2) = BeO
         3. Cross Aluminum (Al+3) with Permanganate (MnO­4-1) = Al(MnO4)3
   4. How to find charges
      1. **Representative Elements (Groups 1A-8A)**
         1. Groups 1A-8A have the following charges
            1. (+1,+2 (skip the middle), +3, +4,-3,-2,-1,-0)
            2. **Long way of saying it = Group 1a = +1 (because it gives up 1 electron), Group 2a = +2, Group 3a = +3, Group 4a = +4, Group 5a = -3 Group 6a = -2, Group 7a=-1, Group 8 = 0. Memorize it!**
         2. Positive ones (always written first) will have unchanged names
            1. Examples – Potassium, Sodium, Boron
         3. Negative ones will change the ending to “ide”
            1. Examples – oxide, phosphide, bromide
      2. **Polyatomic Ions** – The pre-grouped elements with multiple capital letters
         1. Most of their names end in “ate” or “ite” except a few
            1. Examples – Permanganate, Nitrite, Hydroxide
         2. Look on the chart for them (most are negative)
            1. Exception – Ammonium is positive
      3. **Transition Elements** are on the periodic table (Groups B1-B10)
         1. These have multiple possible charges, which is why they have Roman Numerals to represent which charge it has.
            1. Examples – Iron (II), Chromium (III), Copper (II)
2. Example problems (write the formula for the following compounds)

Method = Find formulas with charges and criss cross

* 1. Chromium (II) Borate
     1. Chromium (II) = Transition element; Chromium (II) = Cr+2
     2. Borate = Polyatomic Ion; look on chart; BO3-3
     3. Answer = Cr3(BO3)2
  2. Lead (II) Carbonate
     1. Plumbous = Transition element; Lead (II) = Pb+2
     2. Carbonate = Polyatomic Ion; look on chart; CO3-2
     3. Answer = PbCO­3
  3. Ammonium Bromide
     1. Ammonium = Polyatomic ion; look on chart; NH4+1
     2. Bromide = Representative Element; Bromine; Br-1
     3. Answer = NH4Br
  4. Sodium Nitrite
     1. Sodium = Representative Element; Na+1
     2. Nitrite = Polyatomic Ion; look on chart; NO2-1
     3. Answer = NaNO2

**Take Unit 11 Test Part One on a separate piece of paper**

Part 2 – Writing names from formulas

1. Things to know
   1. Chemicals have two part names. The first part is positive the second is negative.
      1. If you see something like “K2Cr2O7” It does not have 3 names (see below)
2. How to name
   1. **Representative Elements**
      1. Positive ones will have unchanged names
         1. Examples – Potassium, Sodium, Boron
      2. Negative ones will change the ending to “ide”
         1. Examples – oxide, phosphide, bromide
   2. **Polyatomic Ions**
      1. Do not change the names
      2. Be careful – sometimes they are in parenthesis, sometimes not
         1. Example K2Cr2O7 is Potassium (K) with Dichromate (Cr2O7)
         2. You can identify which part is the polyatomic as follows:
            1. Usually the last part because most are negative
            2. The only positive one (first part) would be NH4
   3. **Transition Elements**
      1. These are the hard ones because you have to figure out which charge they are (see below for method)
      2. Example – Copper (I) is different than Copper (II), but they are both written as Cu.
         1. Fe3P2
            1. Iron = Transition element with unknown charge
            2. Phosphorous = Representative element with a known charge of -3. There are two of them, so together the right side has a charge of -6 (-3 x 2 = -6)
            3. The molecule is neutral so the left side has a charge of +6
            4. There are 3 Irons so each has a charge of +2 (6 / 3 = 2)
            5. Since the charge of Iron is +2, we name it Iron (II)
            6. Answer = Iron (II) Phosphide
3. Example problems (write the name for the following compounds)

Method = Find names from the formulas. Remember identify if it is a transition element because it will take extra effort

* 1. Li3As
     1. Li = Lithium (Representative Element)
     2. As = Arsenic (Representative Element)
     3. Answer = Lithium Arsenide
  2. K2Cr2O7
     1. K = Potassium (Representative Element)
     2. Cr2O7 = Dichromate (Polyatomic Ion)
     3. Answer = Potassium Dichromate
  3. CuSO3
     1. Cu = Copper (Transition Element with unknown charge)
     2. SO3 = Sulfite (Polyatomic Ion with known charge of -2)
     3. There are one of each part (one copper, one Sulfite), therefore the charge of copper is +2
     4. Answer = Copper (II) Sulfite
  4. Fe(NO3)3
     1. Fe = Iron (Transition Element with unknown charge)
     2. NO­3 = Nitrate (Polyatomic Ion with known charge of -1)
     3. There are three Nitrates (because of the outer little 3)
        1. So the right side has a total charge of -3 (1x3=-3)
     4. There is one Iron
        1. So to balance it out it has a charge of +3
     5. Answer = Iron (III) Nitrate

**Take Unit 11 Test Part Two on a separate piece of paper**